C-A OPERATIONS PROCEDURES MANUAL

2.28.j   Human Performance Tools for C-AD Staff

Text Pages 2 through 4

C-A OPM Procedures in which this Attachment is used.		
2.28		

<u>Hand Processed Changes</u>

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Collider-Accelerator Department Chairman   Date

R. Karol

2.28.j Human Performance Tools for C-AD Staff

1.   Purpose

     1.1   Use of simple Human Performance Program tools during operations, maintenance, repair and construction activities can significantly reduce errors and events. This will improve safety, equipment reliability and machine availability.

     1.2   This procedure summarizes simple methods to improve performance. These are starting points to develop the use of these tools until they become "skill-based" for staff.

     1.3   The purpose of these tools is to reduce the natural human error rate. Error-prevention tools are defensive measures aimed at preventing and catching active errors.

2.   Definitions

     2.1   Skill-Based Performance – activities done out of habit or memory, usually with a low level of conscious thought. People must successfully do tasks at least 50 to 100 times before it becomes skill-based. In addition the sequence of the activity must have no more than about 10 steps or it becomes too complex to be skill-based. Studies show the natural error rate for skill-based performance is 3 per 1000 times when one performs the same task over and over.[1]

     2.2   Rule-Based Performance– activities performed using rules and the performer knows that rules exist. The performer either knows the rules or can refer to documents or procedures describing the rules. A rule is normally in the format of IF…, THEN… Rule based performance is useful when the task is complex or requires more than 15 steps. The natural error rate for rule based performance when a written procedure or checklist is used is 1 out of 1000; the natural error rate approaches 1 out of 100 if one performs a complex task without referring to written rules.

     2.3   Knowledge-Based Performance ("Lack of Knowledge") – activities in response to a totally unfamiliar situation where the performer of the activity is confused on how to proceed (no skill or rule based performance). The performer usually is aware of their confusion. They cannot "think" their way out of the confusion when they are in a knowledge-based performance mode. They must seek out help by referring to pertinent documentation, or seek help from a subject matter expert. This mode is a classic problem-solving situation that usually presents itself rapidly. Working safely in this mode relies heavily on personal understanding and knowledge of the system, the system's current state, and the scientific principles and fundamental theory related to the system. The natural error rate when one is performing a task in the Knowledge mode ranges between 1 out of 2 and 1 out of 10.

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[1] BNL Human Performance Improvement for Manager, R. Fisher, Fisher IT, Inc.

3. Guidance for the USE of Human Performance Tools

3.1 Skill- Based Activity Tools (STAR)

Use the STAR tool for self-checking during worker-planned work. This tool will slow down your mental process to keep pace with your physical actions so you can think of what you are about to do. It is a method to review the activity, think about potential and expected consequences, ensure you are operating/maintaining the right equipment and verifying the desired results of the activity. This tool is used at the operational level. It is a physical, not a mental tool.

The steps for using STAR are:

1. **S**TOP – Pause before performing the task step. FOCUS on attention to detail and eliminate distractions.

2. **T**HINK – PRIOR to taking any action. VERIFY the action to be taken. Point or touch the correct component, equipment or system. Verbalize out loud to yourself the intended actions and the expected results. Using more than one of your senses (visual and verbal) will make your concentration work better.

3. **A**CT – PERFORM the intended action or step.

4. **R**EVIEW – VERIFY that the actual response was the expected response.

3.2 Rule-Based Activity Tool (Step-by-Step Procedures)

Procedures are used to ensure activities are performed correctly, safely, and consistently. Use the **STEP-BY-STEP** tool when performing rule-based activities to prevent you from jumping into lack-of-knowledge-based performance which has much higher error rates. If using a procedure, make sure you are using the current revision.

If you ignore procedure inaccuracies and "work-around" them, you are setting up your co-worker for failure when they perform this activity in the future. If a procedure conflicts with safety or reliability, DO NOT "work-around" the problems. You must take ownership of the procedure quality in order to improve the procedure for future users.

How to use the STEP-BY-STEP tool:

1. Review the procedure and ensure you have a good understanding of what you are about to do prior to implementing the procedure steps.

2. STOP when a step doesn't make sense, won't achieve the desired results or is known to contain technical inaccuracies or errors.

3. PUT the system in a safe condition, if appropriate, and then contact your Supervisor or the Work Control Coordinator IMMEDIATELY to resolve the problem.

4. If you are interrupted while carrying out the procedure, put a place-keeper in the procedure so you know where you are to resume the activity when you return to it.

3.3   Knowledge-Based Activity Tool (Stop When Unsure)

This tool is to be used when you find yourself with a situation that creates a question, a person is in uncharted (unfamiliar) territory, outside of procedures, expected parameters, process limits, - a knowledge-based performance situation. It is the **STOP When Unsure Tool**. Unsure means finding yourself in a situation that you are not familiar with, a situation where no procedure or process exists when you expect one to be available, and losing track of where you are in a series or sequence of steps.

How to use STOP When Unsure:

1. Obtain an independent information source such as a drawing, procedure, or subject matter expert.

2. Request a peer-check from your supervisor or co-worker. The peer-checker must not be part of the initial job or task, has knowledge or can act in a problem-solving role and is unbiased and not influenced by pressures to complete the job or task.

3. STOP and obtain this help before taking any actions for which you are unsure.

4. The coworker "looks out for you and the associated equipment" and verifies that your actions taken are correct.

5. A healthy challenging attitude of each others actions makes this method most effective.

4.   References

1) Human Performance Fundamentals Course Reference, National Academy for Nuclear Training, December 2002, Revision 6, Institute of Nuclear Power Operations.

2) Human Performance Reference Manual, National Academy for Nuclear Training, October 2006, Institute of Nuclear Power Operations.

3) R. Fisher, Course Handouts, BNL Human Performance Improvement for Managers, Supervisors and Workers.